

## A survey of the sea

# A fisherman's tale

### Overfishing is one part human nature, and two parts poor management

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AT DAWN the boats across the Maricaban Strait dim their floodlights and haul in their nets. Light-fishing is illegal in the Philippines, but the law is routinely ignored. It is a better way of catching fish, and fish are increasingly hard to come by in the South China Sea.

The boats take their haul to market in Anilao, 20 minutes down the coast. Bonito are for sale at the water's edge, and stalls a few paces from the harbour offer rabbit fish, snappers, goat fish and a ropey-looking marlin. The market, which starts at around 6.30am, used to last until mid-morning, but this Saturday the tubs of fish are gone by 8am. Many fish are small, some below spawning age. Filipinos now serve guests species of fish that they barely considered edible a decade ago. One market trader has given up fish and taken to selling chicken instead.

The scarcity is the result of overfishing, and it affects both poor and rich countries, polluted and unpolluted. Although the rich world can afford to manage its fisheries, and commands the expertise of some of the world's best fisheries biologists, it has brought some spectacular failures on itself. In the Grand Banks, off the coast of New England and Canada, it has presided over the collapse of possibly the world's most valuable fishing grounds.

The banks' abundance was legendary. In his recent book on the cod, Mark Kurlansky recalls that when Cartier "discovered" the mouth of the St Lawrence river in 1534, he found a thousand Basque vessels already fishing there. Eventually, the banks attracted fishermen from all over the Atlantic. But by 1992, the biomass of spawning cod off Newfoundland and Labrador had fallen to only 22,000 tonnes, compared with 1.6m tonnes 30 years earlier. America halved its fishing effort in the New England groundfish fisheries. Canada closed the Grand Banks, announcing a five-year aid package worth C\$1.5 billion (\$1.05 billion). The collapse has cost 40,000 jobs in Newfoundland.

The effects of overfishing are masked by the overall statistics, which show that the world's supply of fish has continued to grow nicely as the fishing effort has intensified in one ocean after another (see [chart](/images/19980523/csu904.gif) (/images/19980523/csu904.gif) 3). But the statistics aggregate hundreds of species, and in a practice reminiscent of a Soviet factory of former days, report the catch by weight rather

than by value—a number that is hard to collect. Overfishing threatens to become ubiquitous, and on the whole has not been remedied even in fishing grounds such as the North Sea, where it was first identified as long ago as the beginning of this century.

The world catch of demersal fish (which include the best fish to eat, such as cod and haddock) has not grown since the early 1970s (see [chart](#) (/images/19980523/csu898.gif) 4). Instead, the growth in landings has come from aquaculture and large volumes of pelagic fish, such as the Peruvian anchoveta, that are used mostly to make meal. One study suggests that there are now more low-value pelagic fish precisely because large numbers of their valuable predators have been taken. Indeed, as people “fish down the food chain” in this way, the available catch might increase disproportionately, since predators consume more than their own weight in prey. In some fisheries, therefore, the volume of the catch has grown even as its value has fallen.

The overfishing is spreading. The FAO, which does more than anyone to monitor the world's fisheries, says that 35% of the 200 main stocks are currently in decline and 25% at their peak. Almost all were underexploited a few decades ago. Stocks that have crashed are rarely given the chance to recover completely. Except for stocks in the south-east Pacific (where the newly discovered Japanese pilchard has boosted catches), the stocks classified by the FAO in 1992 as overexploited have been in decline for three decades. Over that period the catch of these stocks has fallen by 4m tonnes, or a third.

## First catch your handout

The reason why overfishing can easily happen is that in most fisheries just about anyone has the right to have a go, and plenty have exercised that right. In past decades, the number of fishermen, as well as fish farmers, has been growing across the developing world. According to Richard Grainger of the FAO, the total worldwide has more than doubled in the past 25 years.

“Open access” can lead to absurd races for fish. In Alaska in the early 1990s anyone could catch sable fish, although the overall total was controlled. As a result, a year's worth of sable fish were usually caught off the coast of Alaska in under a week. Not only are such scrambles dangerous for fishermen but, since most people will pay less for a frozen fish than a fresh one, they are wasteful too. In most fisheries there is no finishing line: the race goes on, week after week, month after month.

But overfishing is more than, in the language of economists, “a tragedy of the commons”. Governments have used subsidies to encourage people to work and invest in fishing, especially after territorial waters were extended to 200 miles in the 1970s and foreign fleets were kicked out. A new study by the World Bank\* estimates that these subsidies are worth a total of up to \$16

billion a year. They come in many forms, including direct aid for building boats and state-financed fisheries management.

Even America, having scrapped programmes to expand the national fleet, still exempts fishing from fuel duty and lets fishermen defer income tax. Fishermen exploit a resource that belongs to everyone, without paying rent—unlike, say, companies that log government-owned land. If you count that as a subsidy too, the study says, the total aid to fishing worldwide amounts to as much as \$21 billion. This is more than a quarter of fishing boats' total revenues, making fishing one of the most subsidised industries anywhere (though less so than farming).

The combination of open access and subsidy inevitably leads to overcapacity. FAO scientists estimate that 53% of the world's fishing fleet is superfluous. In 1996 the EU decided that its fleet should be cut by 40% over six years (although it later retreated from this goal). According to an American estimate, Russia should lose two-thirds of its fleet.

Nevertheless, some countries are still expanding their fishing industries. The number of Chinese fishermen quadrupled between 1970 and 1990. The distant-water fleet has grown especially fast and Chinese officials say they want it to grow further. The EU has bought licences in such places as Africa as a way to deal with overcapacity at home. When Morocco and Namibia tried to end these agreements in the 1990s, the EU applied intense diplomatic pressure. The EU has sometimes paid its fishermen to give up their boats and exported the surplus hulls. The extra boats that arrived in Argentina helped destroy the hake fishery there.

All this points to another factor in overfishing: increasing technological sophistication.

Distant-water fleets bring industrial fishing to countries such as Gabon or Guinea, which do not have big boats of their own. Technology has improved rapidly. The last American sailing boat was fishing on the Grand Banks as recently as 1963. What with new engines, satellite navigation, sonar, computerised gear, you name it, it is still improving all the time. Andy Smith, of the FAO, reckons that even if the fleet's tonnage remained the same, its fishing capacity would increase by 3% a year.

In the face of overfishing, governments have tried to control both the effort that goes into fishing and the catch. This has two shortcomings. The first is that not enough may be known about the fish. The collapse of the Pacific sardine fishery in the 1940s (see [chart](#) (/images/19980523/csu885.gif) 5), which killed Cannery Row and provided a novel for John Steinbeck, was once regarded as a result of overfishing. Research on sediments by the Scripps Institution shows that the collapse was in fact a natural oscillation. In such circumstances, overfishing makes matters worse. Michael Mullin of Scripps says it delayed the return of the sardine by about 15 years.

The obvious answer is to manage fish stocks conservatively. But that is to ignore the other shortcoming of government controls: the bad blood between fishermen and fisheries managers. To a large extent this is a symptom of the

overcapacity created by subsidies and open access, which keeps fishermen under constant financial pressure. “Scientists think fishermen overfish, and fishermen think scientists overprotect,” laments James Baker of NOAA.

The institutions designed to manage fisheries often do not work. America has set up eight regional councils to recommend how to manage fisheries. They are meant to represent all interests, including those of recreational fishermen and conservationists, but some of them have been hijacked by commercial fishermen. Canada's more autocratic system has proved even less effective. At the end of March the Canadian parliament recommended sacking the officials responsible for the Atlantic cod fishery. The EU's common fishery policy is widely loathed for failing either to conserve stocks or to keep fishermen happy. Developing countries often have no fisheries management at all. What laws there are tend to be ignored—sometimes by foreign fleets that have bribed their way in.

The damage from overfishing is mostly economic. According to Mr Grainger of the FAO, the world catch, worth more than \$80 billion, could be 10-20% larger with good fisheries management. America estimates that the profits from its part of the Grand Banks could be \$150m higher. In many poor countries an individual fisherman's catch has barely grown since 1981; sometimes it has dropped.

Fishing also seems to bring even supposedly friendly countries to blows. In 1995 Canada arrested the *Estai*, a Spanish boat from Vigo, which led to a row with the EU. The British have been getting worked up for years about Spanish “quota hoppers”, boats that have, quite legally, bought the right to fish from British skippers. Canada and America fight a running battle over salmon on the north-western coast. Last year a gang of Canadian fishermen blockaded an American ferry in British Columbia. Japan and South Korea have been sparring over the fishing around some rocks the Japanese call Take-shima and the Koreans Tok-to.

But there is a less-noticed toll, too. Some types of fishing lead to large amounts of “by-catch”, made up of unwanted species. Nobody knows how much is killed this way, but the best estimate is 22m tonnes, roughly a quarter of the total wild catch.

On the whole, overfishing does not lead to the biological extinction of species. Left for a few years, the fish seem to recover. According to Pamela Mace, a distinguished fisheries biologist with NOAA, this has happened with herring in Norway and the Gulf of Maine, and striped bass on the Atlantic coast of America. But trawling can damage the sea bed. Some parts of the benthic habitat are scoured several times a year, which gives the animals and plants insufficient time to recover.

Yet fishing does have subtler genetic consequences. Rather than destroy, say, the herring species in its entirety, it may destroy particular groups of fish, such as spring-spawning herring. Surviving fish may also be changed by the relentless hunt. The cod on the Grand Banks now reach sexual maturity at two years of age, instead of four as they used to—presumably because

early-maturing fish have a better chance of spawning. And there is no guarantee that ecosystems will re-establish themselves. The Grand Banks have become home to the Arctic cod, which competes with its Atlantic cousin for food.

Although most fish will not die out as a result of overfishing, a few species of marine animals are threatened with extinction. Most at risk are valuable animals that are stationary. Paul Dayton and Mia Tegner from Scripps have tracked the decline of the white abalone, a shellfish living in the kelp off the Californian coast that has been ruthlessly pursued. Fishermen took 65 tonnes of white abalone in 1972. Now the scientists think that only a few dozen specimens remain. Large, slow-growing creatures, such as whales, are also in danger, as are sharks and skates, which reach sexual maturity late and have few offspring. Sturgeon are included on the list of endangered species. So are sharks, which are killed for their fins.

## Fish and ships

The future of fishing rests on two pillars. The first is better management. This is not a matter of coming up with some big idea, but of making lots of detailed improvements, often at local level. Access can be limited by licensing. Fishermen can be rewarded for husbanding the stock. Satellites and electronic logs can help enforcement officers catch offenders at sea. New gear can reduce the by-catch and protect endangered species, such as turtles and sea birds.

The second pillar is aquaculture. This is growing rapidly, more than doubling in volume to 28m tonnes and almost trebling in value to \$43 billion between 1986 and 1995, according to a new report by the FAO. About half of this takes place in fresh-water ponds.

Aquaculture is usually pilloried for the pollution it causes. The culprits are shrimp and fin fish such as salmon. A study in 1994 found that 80kg of nitrogen compounds and 7.5kg of phosphates were produced for each tonne of farmed salmon, and that 70-80% of the antibiotics that were supposed to protect the fish went to waste. Shrimp cultivation can also pollute, but spectacular outbreaks of disease in Asia farms have been a great incentive for better management.

Pollution from fish farming can be avoided. It is hardly in the farmers' interest to waste medicine and feed. Moreover, carnivorous finfish and crustaceans make up a tenth of marine aquaculture by weight. A far larger proportion is seaweed and shellfish, which are filter-feeders and require no added food. Because they depend on clean water, their farmers are likely to seek a clean environment.

The real worry about aquaculture is genetic. New species, strains and breeds are being used in aquaculture, and being created by it. When fish are farmed, they become domesticated. Farm-bred rainbow trout come to the surface when people approach; their wild cousins hide.

Farmed tilapia can be handled without struggling; the wild fish suffer. Such differences will grow as strains are bred in captivity. More importantly, there is a great temptation to breed improved varieties: salmon that will grow faster, taste better and keep fresher.

These fish may present a danger to wild strains. True, many are unfit to survive outside their cages. True again, breeders will be able to make almost all the hatchlings sterile, or dependent upon some man-made chemical. But these safeguards are not yet absolute, and experience has shown that farmed fish will escape to the wild. As things stand, an escaped gene is more of a threat in the boundless sea than it ever would be on land.

\*“Subsidies in World Fisheries: a Re-examination”, by Matteo Milazzo. World Bank, 1998

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